

Quarterly Report
Covering July 1, 2006 to September 30, 2006
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Project Title

Fish Passage in Montana Culverts Phase II – Passage Goals

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Introduction

This progress report covers work completed between July 1, 2006 and September 30, 2006. Work on the project during this period has been primarily devoted to the collection of field data, with some cursory data analysis.

Project Objective

Culverts are a common and often cost effective means of providing transportation intersections with naturally occurring streams or rivers. Fish passage and fish habitat considerations are now typical components of the planning and design of waterway crossings. Many culverts in Montana span streams that support diverse fisheries. The health of these fisheries is an essential element of a recreational industry that draws hundreds of thousands of visitors to Montana annually. Transportation system planners, designers and managers recognize that fish passage through Montana's culverts is a concern. However, there is much contention concerning the impact that a culvert can have on a fishery. Recent basin-wide studies in Montana (Phase I of this project - final report in November 2004) indicate that the tools that some planners and designers promote for forecasting fish passage concerns may be overly conservative. This is

reflected in the diversity of fish passage goals that are being considered by state agencies in the Northwest. Some managers contend that all culverts should pass all fish at all times, whereas others suggest that this is an unrealistic criterion, particularly during high flow events. Which species, life stages, and how many individuals must have fish passage access for how long, are questions that are often brought forward during discussions on the design and retrofitting of culverts to accommodate fish passage concerns. ***The problem is that for fish species and settings in Montana, the timing and number of fish that must pass a culvert to maintain viable species diversity in the watershed is unknown.***

Progress

With the field season winding down, we are taking some final measurements at the site, filling in some holes on some cross section surveys, and pulling the PIT equipment out of the field.

We have only made a quick pass through the PIT data for the summer. Here are some very preliminary and somewhat qualitative observations:

1. In two spawning seasons (2005 and 2006) in a row, only about a quarter of the tagged fish were detected at the first culvert antenna. This may be because there is a fair amount of good spawning gravel between the trap and the first culvert.
2. Not many of the tagged fish that were detected while entering the system this year (2006) have come back out.
3. A sweep with a hand-held wand antenna between the trap and the first culvert yielded no detection of discarded tags.
4. Some non-project tags have been detected at one of the culverts. The origin of these tags has not yet been identified.
5. Only one fish that was tagged in 2005 was detected in the system in 2006.

We are finishing up some cross section surveys at the bridge and in the control reach. Velocity-flow rate correlations have been made at all the culverts except culvert 5, and will soon be completed for the bridge and control reaches. Culvert 5 has yet to have a tagged fish pass through it, so it will have no successful passes to be entered into the statistical model. If there are no successful passes, a relationship between velocity and flow rate is unnecessary. This culvert (5) suffers from nearly all of the characteristics of a barrier (perched, overly sloped, high velocity, shallow depth), plus it is made of two different diameter pipes (Figure 1) so it really has a barrier within a barrier!



Figure 1. The change in pipe diameter within culvert 5 (standing in the pipe looking upstream) at a low flow rate (approximately 4 cfs). When this picture was taken, the mean velocity in the pipe was visually estimated at 8 to 10 ft/sec, and the flow depth throughout the pie was approximately 3 inches at the invert.

Budget

Expenditures for this cycle are largely a result of stipends and travel to and from the research site.

